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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,904	08/27/2001	Yang Gao	10932-160	5155

7590 09/27/2005

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EXAMINER

WOZNIAK, JAMES S

ART UNIT	PAPER NUMBER
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2655

DATE MAILED: 09/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/940,904	Applicant(s) GAO, YANG	
	Examiner James S. Wozniak	Art Unit 2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-20,22-36 and 42-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 10-15 and 28-33 is/are allowed.
- 6) ☒ Claim(s) 1,2,4-9, 16-20,22-27 and 42-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Response to Amendment

1. In response to the office action from 6/1/2005, the applicant has submitted a request for continued examination, filed 7/15/2005, amending claims 1 and 19, while canceling claims 3, 21, and 37-41, adding new claims 42-47, and arguing to traverse the art rejection based on the limitation regarding the calculation of a pitch enhancement coefficient (*Amendment, Pages 9-11*). The applicant's arguments have been fully considered but are moot with respect to the new grounds of rejection in view of McDonough et al (*U.S. Patent: 5,727,123*).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-6, 16-24, 34-36, 42-43, and 45-46** are rejected under 35 U.S.C. 103(a) as being unpatentable over Swaminathan et al (*U.S. Patent: 5,596,676*) in view of McDonough et al (*U.S. Patent: 5,727,123*).

With respect to **Claims 1 and 19**, Swaminathan recites:

Calculating a pitch enhancement coefficient (*fixed codebook gain index, which would require an inherent calculation step, Col. 21, Line 18- Col. 22, Line 3*);

Providing a fixed codebook comprising at least two fixed subcodebooks (*fixed codebook having two parts, Col. 15, Lines 15-28*);

Selecting one of the at least two fixed subcodebooks (*fixed codebook index, Col. 15, Lines 48-58, and selecting a codebook based on the fixed codebook index at a decoder, Col. 21, Lines 18-48*); and

Applying a pitch enhancement in response to the pitch enhancement coefficient and the one of the at least two fixed subcodebooks (*scaling a fixed codebook vector selected from a subcodebook by an optimum gain factor associated with the vector belonging to a particular subcodebook, Col. 15, Lines 37-47; Col. 21, Lines 18-48*).

Swaminathan does not specifically suggest that a pitch enhancement is calculated according to a long term predictor gain of a previous subframe multiplied by a factor that is different for the at least two fixed subcodebooks, however McDonough teaches a pitch filtering process that multiplies gains from a past subframe having an associated lag with selected codebook entries (*which would be different for each of the subcodebooks as taught by Swaminathan*) (*Col. 16, Lines 21-40*).

Swaminathan and McDonough are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Swaminathan with the pitch filtering process taught by McDonough in order to provide perceptual weighting at a low computational complexity (*McDonough, Col. 15, Lines 41-63*).

With respect to **Claims 2 and 20**, Swaminathan discloses:

Applying a pitch enhancement further comprises calculating a pitched-enhanced signal from a codevector selected from the selected fixed subcodebook, a pitch lag, and the pitch enhancement coefficient (*codevector from a fixed codebook, pitch delay from an adaptive codebook, and fixed codebook gain, Col. 21, Lines 18-48*).

With respect to **Claims 4 and 22**, Swaminathan recites:

The pitch-enhanced signal is calculated during a search through the subcodebooks (*obtaining a codebook vector, which is scaled by a fixed codebook gain, through a search based on an index, Col. 21, Lines 18-48*).

With respect to **Claims 5 and 23**, Swaminathan discloses:

The pitch-enhanced signal is calculated during an iterative search through the subcodebooks (*obtaining a codebook vector, which is scaled by a fixed codebook gain, through a search based on an index for multiple subframes, Col. 21, Lines 18-48*).

With respect to **Claims 6 and 24**, Swaminathan discloses:

The pitch enhancement coefficient is a mathematical factor from 0.0 to 1.0 (*zero gain, Col. 19, Line 64- Col. 20, Line 4*).

With respect to **Claims 16 and 34**, Swaminathan discloses:

For a frame classified as type 0, where the steps of selecting a fixed subcodebook and calculating a signal are accomplished by using at least one factor selected from the group consisting of a pitch correlation, a residual sharpness, a noise-to-signal ratio, and a pitch lag (*subframe-based processing and autocorrelation lags, Col. 21, Lines 18-48*).

With respect to **Claims 17 and 35**, Swaminathan recites:

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The speech compression system is a selectable mode vocoder (SMV) system (*multi-mode speech encoder, Col. 3, Line 59- Col. 4, Line 4*).

With respect to **Claims 18 and 36**, Swaminathan discloses:

The method is applied to a code-excited linear prediction (CELP) system (*Abstract*).

With respect to **Claims 42-43 and 45-46**, Swaminathan teaches the classification of voiced and unvoiced speech signals for further pitch processing (*Col. 7, Lines 32-39*).

4. **Claims 7-9 and 25-27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Swaminathan et al in view of McDonough, and further in view of Yeldener et al (*U.S. Patent: 5,774,837*).

With respect to **Claims 7 and 25**, Swaminathan in view of McDonough teaches the speech decoder utilizing a codebook containing multiple subcodebooks, as applied to Claim 1. Swaminathan in view of McDonough does not specifically suggest applying a pitch enhancement factor forward and backward, however, such a forward/backward pitch adaptation is well known in the art as is evidenced by Yeldener:

The pitch enhancement is applied both forward and backward (*adjusting pitch forward and backward using pitch tracking to improve the perceptual quality of output speech, Col. 12, Lines 26-50*).

Swaminathan, McDonough, and Yeldener are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the method of forward and backward pitch adjustment taught by Yeldener with the speech decoder utilizing a codebook

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containing multiple subcodebooks taught by Swaminathan in view of McDonough to provide pitch continuity between speech frames using forward and backward pitch adjustment, thus obtaining higher quality output speech. Therefore, it would have been obvious to combine Yeldener with Swaminathan in view of McDonough for the benefit of obtaining pitch continuity between speech frames using forward and backward pitch adjustment (*Yeldener, Col. 12, Lines 26-50*).

With respect to **Claims 8 and 26**, Swaminathan further discloses look-ahead and look-back pitch tracking (Col. 6, Lines 16-41), while Yeldener additionally recites the combined forward and backward pitch adjustment as applied to Claims 7 and 25.

With respect to **Claims 9 and 27**, Swaminathan additionally discloses: Pitch enhancement coefficient is applied to a first power (*fixed codebook gain, which is applied once, Col. 21, Lines 18-48*).

5. **Claims 44 and 47** are rejected under 35 U.S.C. 103(a) as being unpatentable over Swaminathan et al in view of McDonough, and further in view of Jarvinen et al (*U.S. Patent: 5,946,651*).

With respect to **Claims 44 and 47**, Swaminathan in view of McDonough teaches the speech decoder utilizing a codebook containing multiple subcodebooks, as applied to Claim 1. Swaminathan in view of McDonough does not specifically suggest a pitch enhancement coefficient derived by multiplying the LTP gain by 0.25 that is constrained between 0.0 and 0.5, however Jarvinen teaches such an enhancement constant (*Col. 7, Line 58- Col. 8, Line 14*).

Swaminathan, McDonough, and Jarvinen are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Swaminathan in view of McDonough with the pitch enhancement constant taught by Jarvinen in order to further improve perceived speech quality (*Jarvinen, Col. 3, Lines 23-29*).

Allowable Subject Matter

6. **Claims 10-15 and 28-33** are allowable over the prior art of record.

7. The following is an examiner's statement of reasons for allowance:

With respect to **Claims 10 and 28**, the prior art of record fails to explicitly teach or fairly suggest a multi-rate speech coding system featuring a fixed and adaptive codebook, wherein the fixed codebook is divided into two or more subcodebooks with varying pulse formats, that applies a pitch enhancement coefficient to a first power for pulses one pitch lag away from a main pulse and to the second power for pulses two pitch lags away from the main pulse. The prior art of record also does not explicitly teach or fairly suggest the above functions in combination with a pitch enhancement that is applied forward and backward and is calculated dependent upon a particular subcodebook using a different formula for each subcodebook as shown in Table 1 of the specification.

In addition to the prior art utilized in the above rejections, Taumi et al (U.S. Patent: 5,787,389), teaches a method for applying gain weights based upon a frame delay, however

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Taumi does not teach nor fairly suggest a pitch gain applied to a first power for pulses that are one pitch lag from a main pulse and applied to a second power or squared for pulses that are two pitch lags from a main pulse.

Since **Claims 11-15 and 29-33** further limit their objected parent claims, these claims are also allowable over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Jacobs et al (*U.S. Patent: 5,414,796*)- teaches a speech coding method that utilizes a past frame's pitch lag and gain for a current frame.

Moriya et al (*U.S. Patent: 5,787,391*)- teaches a means for adjusting a prediction gain from a past frame.


9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632. The examiner can normally be reached on M-Th, 7:30-5:00, F, 7:30-4, Off Alternate Fridays.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached on (571) 272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James S. Wozniak
8/11/2005



W. R. YOUNG
PRIMARY EXAMINER